M.A.R.S. Making Aerospace Real for Students

News
AEROSPACE EDUCATION
Inspiring Students to Excel

Mar-Apr 2005

IN THIS ISSUE

Topics of Interest

Aerospace Education News is the official bi-monthly publication of the Civil Air Patrol and is produced by the Leadership Development and Membership Services Directorate, CAP National Headquarters, Maxwell AFB, Alabama.

Judy Rice.....AE Deputy Director
Judy Stone.....Editor
Peggy Greenlee.....Layout/Graphics

Contributing Writers:
Kathy Baucum
Jeff Montgomery
Claudine Sayegh
Barry Spink
Beth White

AE Partners.....Technical Articles
Printing Service.....Terry Fontaine and the CAP Print Plant

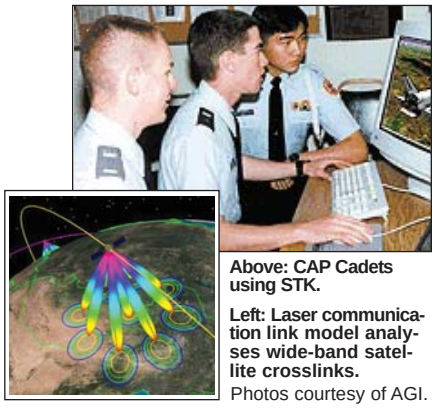
If you have news, events, or ideas we might consider for the newsletter, please submit them electronically to jstone@cap.gov.

SATELLITE TOOL KIT (STK) — A Great Resource

Analytical Graphics, Inc. (AGI), developers of STK, has been a wonderful partner to Civil Air Patrol. STK is the leading off-the-shelf software package that supports end-to-end satellite systems from mission planning through operations. Basic applications include tracking satellite locations, determining when they have access to certain areas, and analyzing what satellites can see at any point in time. STK makes it easy to analyze complex land, sea, air and space scenarios and determine optimal solutions. It provides the ability to present results in graphical and text formats for easy interpretation and analysis. STK is used by tens of thousands of professionals worldwide. It is used by over 70 major universities, branches of the military, government and commercial operations working in space.

A few months ago AGI gave CAP 500 STK 5.0 disks free. These disks allow our members access to the incredible capability of STK. Let's take a moment and explain the procedures for CAP's Units to use this exceptional product. First, all Wing Directors of Aerospace Education were given several STK disks to distribute to their units based on requests. Squadrons must obtain a license in order to use STK, and here is how that works:

- A unit notifies their wing DAE that they want the disk.
- The DAE will loan the disk to the unit to be downloaded on the squadron's computer (STK is for the squadron computer, (not someone's personal computer).
- When the squadron loads the disk, a host ID number and a registration number will appear on the screen.
- Copy those numbers and email Jeff Montgomery at **jmontgomery @cap.gov.**
- Jeff will send that information to AGI, who will in turn provide the licensing information.
- Jeff will then email that information to the squadron. Follow the loading instructions and STK will work on the squadron com puter.



Above: CAP Cadets using STK.

Left: Laser communication link model analyses wide-band satellite crosslinks.
Photos courtesy of AGI.

After obtaining a license, the wonderful world of STK will open up to you. The Supplemental Space Module, which is located on CAP AE's website (***www.cap.gov/ssm.html***), contains several scenarios that will take you step by step through some satellite applications. Interested cadets and seniors should get with their AEOs and have them contact their DAEs. Hours and hours of challenging and rewarding times await you.

AEMs are also eligible to receive a STK license for their classroom computer. If you are interested contact Jeff Montgomery at the above email address and he can explain what to do next.

Estes-Cox and CAP: Partners in Aerospace Education

What can be more fun than working with rockets and airplanes! Estes-Cox Corporation gets to do this every day because they create and manufacture model rockets and airplanes. Estes-Cox is a diverse company that manufactures over 100 aviation and space-related products. Estes is known for its model rocket kits and model rocket engines and is considered the world's leader in model rocketry. Cox is famous for its .049 gas engines for control line, free flight and radio control airplanes plus its electrical R/C airplanes. Estes-Cox is a company in a unique position because its products are fun and educational. Because of this, they have an education division called "Estes Educator™".

According to Ann Grimm, Director of Education for Estes-Cox, a few reasons model rockets and airplanes are very educational are because the activities of building and flying the rockets and airplanes meet many national learning standards, can be integrated into every subject, teach many science principles, are highly motivating, help build self esteem, are a great hands-on lesson and develop real world connections for students.

Estes Educator's goal is to ignite students' imaginations by providing the materials educators need to safely and successfully promote hands-on explorative learning. Estes Educator provides materials such as model rocket kit bulk packs, model engine bulk packs, learning software, classroom tools and ready-to-use curriculums.

Estes® took their most popular educational rocket kits and packaged them in the Estes Educator Bulk Packs. Each bulk pack box contains 12 model rocket kits. The kits are individually bagged to assure a complete set of parts for each student plus it also helps the teacher have control of the rocket building activity. There are bulk pack rockets for beginners, intermediate and advanced students. Model rocket engines to launch the rockets are available in bulk packs of 24.

There are Estes Educator curriculums for teachers and youth group leaders. These curriculums are used by thousands of educators to help them effectively teach Estes model rocketry to their students. The curriculums come with ready-to-use daily lesson plans, overhead masters, student worksheets and certificates. They are located on the Estes Educator Website at www.esteseducator.com. This site is a huge resource center for educators.

The Estes Educator Workshop Leader program introduces teachers and youth group leaders to Estes model rocketry. Over 800 volunteer workshop leaders, including many CAP members, conduct model rocket workshops that include building and launching the Estes Alpha® rocket. This workshop program reaches over 8000 new educators every year.

Estes-Cox Corporation and Civil Air Patrol have a long history of working together in aerospace education. Both organizations have worked together for many years sharing model rocketry and aviation with CAP Aerospace Education Members and volunteers and the CAP Cadet Model Rocketry program. In addition, for the last year Estes-Cox has been a Corporate Partner with Civil Air Patrol. Through this program the Estes-CAP Teacher Scholarship program was developed. The scholarships provide teachers with a one-year membership in CAP's Aerospace Education Membership (AEM) program. Estes-Cox, the U.S. Department of Education and CAP have worked together to give 400 scholarships to inner city teachers in 16 areas across the U.S. .

Last, but not least, Estes-Cox has a special way of introducing model rocketry to kids and their families. They sponsor Estes 'Make It - Take It' events where children and their parents get to make an Estes rocket and take it with them. These rocket building events have been conducted at places like Legoland, Disney World, AMA Grand Event and EAA's KidVenture. Many participants have said that the 'Make It - Take It' was the "neatest thing I've ever done." Because of all this, Estes-Cox and the Estes Educator department will continue to keep putting smiles on the faces of kids, parents, teachers and youth group leaders for many years.

AE SPOTLIGHTS... AEM ANN GRIMM

Ann Grimm first developed her passion for aerospace in 1969 when her husband earned his private pilot's license and they bought an airplane. She took flying lessons and together they flew to many places around the country. Her teaching career, in fifth and sixth grade science, began that same year and Ann took her excitement about aerospace into the classroom where she created a year-long, in-depth, hands-on science and math curriculum with aviation and space as the central theme. When her son and daughter became interested in model rocketry, Ann brought the excitement she saw at home into her science classes, integrating many subject areas into rocketry studies and sharing a passion that helped her students to accelerate their science and math skill levels.

Throughout her years in the classroom, Ann was involved in curriculum development, in presenting workshops and in supervising student teachers and teacher apprentices. She became a National Eisenhower Lead Science Teacher and mentored many science teachers.

In 1996, Ann became the national Director of Education for Estes Rockets and Cox Aviation. In this capacity, she presents workshops to thousands of students and teachers each year and works with more than 800 volunteer workshop leaders who teach more than 8000 teachers the hands-on model rocketry/aviation curriculum each year. Through these teachers, her passion for aviation and space has made an impact over the past nine years, serving to ignite the imaginations of well over a million students worldwide.

Through varied activities such as science fairs, the National Boy Scout Jamboree and EAA's KidVenture, Ann works directly with students to build and launch rockets. She has presented her popular "Rockets Ignite the Imagination!" teacher workshops for NSTA, NCASE, the Kennedy Center Imagination Celebration, the Space Foundation and many other education-based organizations. Ann has served as an event judge for both state and national Science Olympiads. She created and supervised volunteer leaders building Estes model rockets and also launched rockets with thousands of children at Walt Disney World's "Cool Summer Nights" events and Legoland's "Operation Space Weekend."

In April 2003 at the Civil Air Patrol's National Congress on Aviation and Space Education, Ann was inducted into the Crown Circle for Aerospace Education Leadership excellence. That same year the City of Colorado Springs, CO honored Ann for her national achievements in aerospace education. Ann has had the opportunity to meet and work with many of the astronauts and national leaders in aerospace education. She is currently a Space Foundation Teacher Liaison and working with the X PRIZE Foundation as their education partner.

Ann continues to introduce educators and students to the exciting world of model rocketry and aviation. She enjoys her work and says that the Director of Education for Estes-Cox Corporation is "a very challenging and rewarding position because sharing the contagious excitement of model rockets and aviation in turn excites and motivates students in aerospace." Children, teachers and youth group leaders at all grade levels have been touched by Ann's enthusiasm, by her creative talents and all have been enriched by her passion for aviation and space education.

Cappy's Quiz

A highly elliptical and highly inclined orbit is known as:

a. sunsynchronous
b. geosynchronous
c. Molniya

AE SPOTLIGHTS... AEO MAJOR RICHARD HARKNESS

Major Richard W. Harkness is the North Carolina Wing Director of Aerospace Education (DAE). He has held the position since January 2004. Originally joining CAP in October 1996, Maj. Harkness served as Unit Communications Officer, Deputy Commander, Unit Com-mander, Group AEO and Group Emergency Services Officer before serving on Wing Staff as Internal AEO. He also holds Mission Pilot, Ground Team Leader, Communications Unit Leader, Operations Section Chief and occasional Incident Commander trainee (IC/T) ES Ratings. Maj. Harkness has completed the Aerospace Education Program for Senior Members (AEPSM) and holds the AE Specialty Track Master Rating.

According to Maj. Harkness, one of the biggest satisfactions in serving as DAE is the opportunity to promote, empower and support the unit and group level AEO's in fulfilling the Civil Air Patrol's charter mission. His view of his job as DAE is to bring the wing and higher resources to bear to help the units with their AE programs.

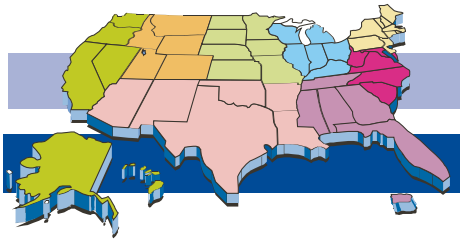
This committment has been evident in two particular examples. The first being the support for the December 2003 First Flight Centennial Celebration at Kitty Hawk. The NC Wing cadets and seniors helped to promote AE from a booth at the Dare County Airport, home base for the Group 8 Coastal Patrol Base 16 and provided support for the Emergency Services activities. Maj. Harkness was able to serve as IC/T and live among some of North Carolina Wing's most devoted CAP members for a week, along with a variety of warbirds parked right out in front of the command post (CP). "Every plane that performed over Kitty Hawk seemed to use the CP as a waypoint. We saw everything from P-51's to Air Force One fly over the field on their way to the monument. That was an AE experience you just don't forget," said Maj. Harkness.

The second example of the level of excellence of this program was demonstrated in the NC Wing Compliance Inspection Report for 2004. The Aerospace Education section of the report gave the NC Wing an "Excellent" rating. "It is good to see a great program get a great report card," said Mark Wilkinson, National Headquarters NC contact for AE.

According to Major Harkness, the NC Wing is fortunate to have the support from the NC Dept of Crime Control and Public Safety, the Wing Directorates, the Group/Unit Commanders and senior and cadet AEO's to help promote AE in all activities. Funding was made available to help promote the 2004 Model Rocketry Program with starter rockets for Group and Wing level competition. It really brought out the fun in the program and a tremendous amount of expertise (cadets and seniors) surfaced to take the project from inception to completion in less than 4 months.

Maj. Harkness gives much credit to the desire and dedication of the seniors and cadets at the Unit/Group and Wing level for helping NC Wing fulfill the AE mission. He really enjoys being able to leverage people's skills and bring members from all over the Wing together for an AE activity and just watch it unfold.

Richard Harkness says, "A reminder to all members is that CAP's charter mission includes Aerospace Education and that on the three-bladed prop (in the emblem for CAP), the blade pointing up represents the AE mission (in my opinion). And to always remember that AE begins with you!"



REGION TO REGION

NORTHEAST REGION

April 9
The 6th Annual New England Aviation EXPO will be held at Daniel Webster College in Nashua, NH. For more information, go to ***http://www.faa.gov/region/ane/expo***.

MIDDLE EAST REGION

March 13
Mary Feik will discuss her trailblazing career as a mechanic, aviation educator, and aircraft restorer at the Sunday "Speaking of Flight" lecture series at the College Park Aviation Museum in College Park, MD. For more information concerning this and other museum events, go to ***http://www.pgparks.com/places/historic/cpam/events.html***.
March - April
Teacher workshops presented by the Science Museum of Virginia in Richmond, VA include:
March 9 - (Grades 3-5) Physical Science Solutions
March 23 - (Grades K-5) Scientific Investigation, Reasoning, and Logic
April 27 - (Grades 4-6) Earth In Space-
To find out more about these workshops for teachers and other offerings, check out their website at:***http://www.smv.org/prog/Just4Tchrs.html.***

GREAT LAKES REGION

May 9-11
50th Annual Wisconsin Aviation Conference will be held in Lake Geneva, WI. For more information, go to ***http://www.wiama.org/WAC/conference.htm***.

SOUTHEAST REGION

March 19
Attend the Spring EAA Fly-In in Saint Elmo, AL. To find out who to contact for this event, go to ***http://www.eaa.org/events/2005March.html***.
April 12-18
Sun 'n Fun EAA Fly-In will be held in Lakeland, FL. For more information, go to ***http://www.sun-n-fun.org/content/***.
May 18
The Skymaster Owners and Pilots Association's 4th Annual Fly-In will be held in Key West, FL at the Southernmost Hotel & Resort Meeting Room. For details, go to ***http://www.337skymaster.com/KEYW2005.htm***.
May 21-22
Wings 'n Wheels - Air, Military, and Vehicle Show 2005 will be held at the St. Lucie County Airport in Ft. Pierce, FL. For additional information, go to ***http://www.wegoplaces.net/Event_1003.aspx.***

NORTH CENTRAL REGION

March 5
LSC (Lake Superior College) Flight Student's Ski Plane Fly-in will be held in Duluth, MN. Contact Julius Salinas, Lake Superior College Aviation Coordinator, at j.salinas@lsc. mnscu.edu for more information.
April 3-5
The 67th Annual International Technology Education Association (ITEA) Conference will be held in Kansas City, MO at the Kansas City Marriott Downtown.
For more information, go to

SOUTHWEST REGION

March 2
More than 100 employers in aviation/aerospace, business, engineering, and high technology will be on hand to talk with jobseekers at the 2005 Industry/Career Expo. The expo will run from 10 a.m. to 3 p.m. in the activity center at Embry Riddle Aeronautical University - Prescott, AZ, campus, 3700 Willow Creek Rd. It is free and open to the public. For more information email luz.hall@ erau.edu.
March 4-5
The Arizona Antique Aircraft Association invites you to attend the 47th Annual Cactus Fly-In to be held in Casa Grande, AZ. For more information on this event go to ***http://www.cactusflyin.org/***.
March 10-12
The 16th Annual International Women in Aviation Conference will be held at the Adams Mark Hotel in Dallas, TX. For more information, go to ***http://www.wai.org/***.
March 22-24
The Texas Aviation Conference will be held at the Townlake Hyatt Regency Hotel in Austin, TX. For information, call 1/800/68-PILOT.
April 9
The Bluebonnet Airshow will be held at the Burnet Municipal Airport in Burnet, TX. For more information, go to ***http://www.highlandlakessquadron.com*** (updated soon).
May 13-15
The EAA (Experimental Aircraft Association) Southwest Regional Fly-In will take place at the Hondo, TX Airport. For details, log on to ***http://www.swrfi.org/default.htm***.
May 21
The Denton Air Fair will be held in Denton, TX. For more information, go to ***http://www.cityofdenton.com/pages/enjoyfestairfair.cfm.***

ROCKY MOUNTAIN REGION

March 3-5
Montana Aviation Conference will

AEO/AEM NEWS AND VIEWS

Winter 2004 AEF Grants

The Aerospace Education Foundation recently announced the grant winners of the Winter 2004 AEF CAP Unit Grant cycle. They comprise the list at the end of this article.

We are very grateful for the continued outstanding support AEF has shown CAP. Since 1996, AEF has provided over $120,000 in grants for CAP Units and CAP educators who promote aerospace education within CAP and in the classrooms of America. The resources provided by AEF in 2004 alone have allowed CAP to reach over 13,000 cadets and students for aerospace education. Youth across our country are learning about aerospace through the efforts of this grant program.

Has your squadron applied for a grant? Or, if you are an AEM, have you applied? The grants are for $250 and are awarded for promoting aerospace education. Our next cycle is an educator grant cycle with a deadline of March 31st. Please get your applications in before then. You can visit CAP AE's website and download the grant application and follow the directions. You can mail the application or fax it to the address at the bottom of the form.

Please remember that grant winners are required to complete the feedback form also included on our website. This is a very important step in the continuation of this grant program. The form will take only a couple of minutes to complete. It is imperative that we continue to show our appreciation for the outstanding support given to us by AEF.

Winter 2004 Unit Grant Winners

Albany Composite Sq	GA
Anoka Composite Sq	MN
Apex Cadet Sq	NC
Batavia Cadet Sq	NY
Beartooth Composite Sq	MT
Canandaigua Composite Sq	NY
Chapel Hill Composite Sq	NC
Franklin County Composite Sq	NC
Hammond Senior Sq	LA
Howard K. Vedder Composite Sq	NY
Leesburg Composite Sq	VA
Marauder Composite Sq	TX
Metropolis Composite Sq	IL
Missouri Wing HQ	MO
Myrtle Beach Composite Sq	SC
New Century Composite Sq	KS
Viking Composite Sq	MN
Virginia Wing	VA
Waukegan Composite Sq	IL
Winchester Composite Sq	VA

National Aerospace Education Officers School

The fourth annual National AEO School will be held at Pensacola NAS, Florida from July 21-23, 2005. This school brings together wing, region and headquarters staff presenting valuable information to the attendees concerning CAP's aerospace education mission, aerospace programs, and the job responsibilities of our volunteers. For registration and more information go to: ***www.cap.gov/ae*** and click on item number 10.

REGION TO REGION (cont.)

RMR cont'd

be held in Butte, MT. For more information, call 406-444-2506.

March 10

The 2005 Idaho Aviation Festival will be held at Boise Centre on the Grove in Boise, ID. For details, go to ***http://www.itd.idaho.gov/aero/AviationFestival***.

April 4-7

The 21st National Space Symposium will be held at the Broadmoor in Colorado Springs, CO. For more information, go to ***http://www.spacesymposium.org/national05/information/index.cfm***.

PACIFIC REGION

May 14

Alaska State Aviation Trade Show & Conference will be held in Anchorage, AK. For additional information, go to ***http://www.alaska airmen.com*** and click on the Trade Show Exhibitor Information button.

ITEMS OF INTEREST

March 25, 2005 *Deadline*!

The Experimental Aircraft Association's (EAA) 2005 Youth Art Competition's theme is to design a paint scheme for the official Young Eagles' airplane. To find out more, go to ***http://www.airventuremuseum.org/art/youth_art.html.***

March 30, 2005 *Deadline!*

National Coalition for Aerospace Education's Dr. Mervin K. Strickler, Jr. Aerospace Education Leadership Award for 2005 application form and information can be found on the CAP AE website at ***http://www. cap.gov/ae*** and click on number 20.

May 1, 2005

Space Day 2005. For more details and information, go to ***http://www.spaceday.com***.

May 21, 2005

Team America Rocketry Challenge— AIA and the National Association of Rocketry co-sponsor the 2005 Team America Rocketry Challenge, on Saturday, May 21, at The Plains, VA. For more information, go to: ***http://www.rocketcontest.org*** .

August 19, 2005

National Aviation Day

CURRICULUM CORNER.....
Remotely Sensing (Activity from NASAexplores.com)

Objective:
Students should be able to analyze satellite images using mathematical skills.

National Science Standards:
Content Standard E: Science and Technology
- Understandings about science and technology

Content Standard F: Science in Personal and Social Perspectives
- Science and technology in local, national, and global challenges

Unifying Concepts and Processes
- Constancy, change, and measurement

National Mathematics Standards:
1. Number and Operations Standard
   - Compute fluently and make reasonable estimates.
2. Algebra Standard
   - Analyze change in various contexts.
6. Problem Solving Standard
   - Solve problems that arise in mathematics and in other contexts.
9. Connections Standard
   - Recognize and apply mathematics in contexts outside of mathematics.

Grade Levels:
9-12

Time Period:
30 minutes

Bats sense their environment by emitting sound waves (shown in black) and listening for the reflected echo (shown in white).

Background Information:

What is remote sensing? In its broadest definition, remote sensing is collecting information about an object without being in physical contact with it: learning without touching. The most familiar kind of remote sensing is the use of our eyes to detect light. Sound, heat, and X rays are other familiar examples of things that are remotely sensed. Bats sense their environment by emitting sound waves (shown in black) and listening for the reflected echo (shown in white). We learn without touching when we hear. When a car honks its horn, we can immediately tell if we are in danger or if it is just an annoyance. Animals use sound in sophisticated ways. Bats use it to find insects and to learn of their surroundings. Sound waves are used in medical imaging (ultrasound) and by ships looking for submarines (sonar). When we sit near a fire, we sense its radiant energy (heat). This is a form of remote sensing! Other animals can sense heat even better than humans. Rattlesnakes, with special organs on their heads, are able to detect heat radiation from small animals, like mice. Satellites use remote sensing too.

A satellite gathers information about something that it is not in contact with and sends that information to people on the ground. Sometimes, a satellite uses a camera to get a picture, like we would use our eyes to see. The camera is called a sensor, since that is what the satellite uses to sense, or gather, the information. Satellites can use other types of sensors, and sense things that people can't. You can see a lot of the Earth from the top of a tall building, and even more from the top of a mountain. But, there isn't always a building where you want one, and no mountain is high enough to let you see the entire Earth. This is one of the great strengths of space-based remote sensing. It allows you to put sensors in places people can't go.

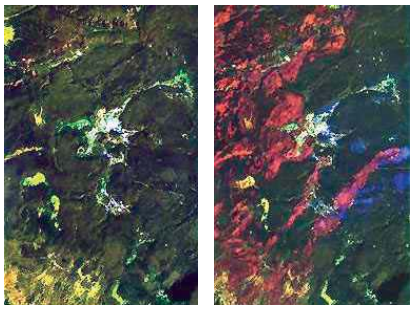
Remote-sensing pictures are used every day by:

Huygen's probe set to land on Saturn's moon

- Archaeologists searching for ancient ruins
- Mapmakers and relief workers when there is an earthquake, flood, or volcanic eruption
- The Coast Guard, to help ships avoid icebergs
- Urban planners who need data for land-use analysis
- Geologists, to find minerals, oil, or geothermal energy sources
- Ship captains, to save fuel by following ocean currents
- Farmers, to assess insect damage
- Weather forecasters and climate researchers
- The fishing industry, to locate the best areas for fishing
- Military reconnaissance experts
- Astronomers

There are hundreds of uses for remote sensing. New ones are being developed every year. A new way of doing remote sensing that allows more mobility is the new Altair aircraft. Scientists can fly it into a storm, around a volcano, or above extremely rough terrain without ever leaving the laboratory. Today's lesson will give you a chance to do the job of a scientist by analyzing pictures that were taken remotely by satellites.

Materials:
- Internet
- Calculator (optional)
- Color printer (optional)



These two satellite images show before (left) and after (right) forest fire pictures of Yellowstone National Park, Wyoming. *(Satellite pictures courtesy of NASA.)*

Procedure:

1. Duplicate the Student Sheets (one per student).
2. You will need to reserve a computer lab or media center before you begin this activity. If you have a large-screen monitor, this can be done as a class activity.
3. If you do not have Internet access for each student, you can print out the pictures they will need on a color printer. Black-and-white pictures will take away from the power of this activity.
4. Based on your resources, you can divide the class into groups of two or three students.
5. If you are using the Internet, be sure to review the school's policy on Internet usage.
6. Print the instructions that follow for each student or group of students to do the activity:
   - You will get to experience remote sensing first hand. You will be given images and asked to analyze them. Follow the instructions given on the screen. For added help, there is a practice analysis on one image that is done for you. Be sure to look it over carefully.
   - Visit NASA's Observatorium Web site, listed below. ***http:// observe .arc.nasa.gov/ nasa/ exhibits/eyes_sky/home.html***
   - Answer the first question about the image.
   - Look at the image. You may want to jot down what the colors mean for future reference.
   - If you do not know what a pixel is, click and find out. Otherwise, process the image.
   - It shows you how to determine the area shown in the picture based on the pixel size.
   - The next page has two activities: the 1988 Yellowstone National Park Wildfires and the 1993 Flooding in St. Louis, MO. Complete one of them (the order is not important), then come back and do the other.
   - Follow the instructions on the screen carefully. You can use your own calculator, or you can use the one provided in the Web site. Look at the images.
   - Fill in the boxes in this chart. Be sure to include the units used in your calculations. If your teacher wants you to, you can submit your results online to the Forestry Service or to the Relief Effort.

These two satellite images show before (left) and after (right) flooding pictures of St. Louis, Missouri. *(Satellite pictures courtesy of NASA.)*

Yellowstone Forestry Service

Amount of forest before fires	
Amount of forest burned	
Amount of forest after fires	

St. Louis Relief Effort

Amount of area flooded	

Answer to Cappy's Quiz

c. Molniya